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MINERALOGY.—*An occurrence of iron-cobalt bearing gersdorffite in Idaho.* EARL V. SHANNON.[1]

A lot of material received for examination at the National Museum from Erwin Ploetzke contains a gray sulpharsenide of nickel, cobalt, and iron. The specimens were mailed from Burke, Idaho, and a letter accompanying them stated that they were from a prospect of Ploetzke in Idaho. Inquiries as to the exact locality met with no reply. Recently a similar lot of material was received from A. Beals of Avery, Idaho. An inquiry directed to Mr. Beals elicited the information that both lots were from the same prospect in which Mr. Ploetzke is a partner. It is located one mile above the mouth of Slate Creek, 7 miles from Avery. This is the first source of nickel minerals in Idaho. The deposits of the Blackbird district in Lemhi County are commonly referred to as cobalt-nickel deposits but, as a matter of fact, they contain almost no nickel. The Avery locality is in Shoshone County.

The specimens consist of greasy-appearing, greenish, sheared quartz containing the gersdorffite associated with pyrrhotite and chalcopyrite. The gangue contains a small amount of a grayish carbonate, probably ankerite. The quartz contains small open spaces lined with imperfect quartz crystals on which rest occasional whitish crystals of barite and minute pale-green globular or barrel-shaped aggregates of a scaly micaceous mineral. The latter is probably a chlorite. Optically, it is biaxial positive with 2V medium small, estimated at 30°, and refractive index is about 1.62. As a later deposit in the cavities there occur rose-red crusts of minute crystals of erythrite (cobalt bloom) too small to be measured but identified

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by their characteristic optical properties, and some dead-black material which may be heterogenite.

The gersdorffite appears to form masses up to several centimeters in diameter either pure or mixed with other sulphides. However, the mineral is not massive but consists of closely spaced small individual crystals, less than a millimeter in diameter, separated by quartz. Specimens may be selected which contain a large proportion of the mineral practically free from other sulphides. Several of these were crushed and sized by screening, and the quartz separated by methylene iodide. A few grains of pyrrhotite were separated with a hand magnet. Microscopic examination showed this prepared sample to be free from other sulphides. It was analyzed yielding the following results and ratios:

TABLE 1.—ANALYSIS AND RATIOS OF GERSDORFFITE FROM IDAHO

Quartz	3.48			
Cobalt	9.09	0.154		
Nickel	14.28	0.243	0.586	1.02×1
Iron	10.57	0.189		
Arsenic	43.80	0.584	0.584	1.02×1
Sulphur	17.70	0.552	0.552	0.96×1
Total	98.92			

The ratios indicate the formula (Ni, Fe, Co) AsS with the ratios Ni:Fe:Co = 7; 5; 2 approximately.

Several crystals, isolated from the quartz, were measured and were found to be isometric combinations of cube and octahedron.

It is evident that the mineral is a member of the pyrite group and a sulpharsenide of nickel, iron and cobalt. It is thus a 3-component isomorphous mixture of the gersdorffite and cobaltite molecules with a hypothetical iron sulpharsenide not yet recognized as a distinct mineral. Since the gersdorffite molecule is definitely predominant over the others in the present mineral it may be designated gersdorffite.

The color of the mineral is steel-gray like arsenopyrite. After exposure it becomes dull and assumes a barely perceptible reddish tinge. In the closed tube it gives, like arsenopyrite, copious sublimates of arsenic sulphide and arsenic.

Polished surfaces of the ore, examined in reflected light, disclose the angular crystals of gersdorffite which have probably replaced the quartz metasomatically. Pyrrhotite occurs in a network of fine veins forming the matrix of angular quartz grains. The only

other metallic mineral present is white in color and is unattacked by the usual etching reagents including nitric acid and acid permanganate. This may be pentlandite. It is present in very small amount and bears the same relation to the quartz as the pyrrhotite.

The gersdorffite is resistant to all reagents except that, with long etching with acid permanganate, a faint zoning becomes visible by the slight darkening of certain layers in the crystals showing, probably, slight differences in composition.

The associated pyrrhotite, when separated and purified, contains a mere trace of nickel.

GENETICS.—*Do balanced lethals explain the* Oenothera *problem?*[1] STERLING H. EMERSON, University of Michigan (Communicated by H. H. BARTLETT).

It has been proposed by Muller (1917, 1918) and by Morgan (1918) that the balanced lethal explanation suggested by De Vries (1911, 1918) only to account for his double reciprocal crosses probably lies at the root of nearly all the unusual genetic phenomena of the Oenotheras. This view was supported by G. H. Shull, who reported at the Toronto Meetings of the American Association for the Advancement of Science in December, 1921, that he had proved the correctness of Muller's hypothesis. He stated that, with the exception of the short style of *brevistylis*, all the known genetic characters of *Oenothera* probably lie in a single chromosome pair. Since then data have been published to support this announcement (Shull, 1923-a, 1923-b).

Since the beginning of genetical studies on *Oenothera*, experimenters have been impressed with the striking correlations between various characters, and some breaks in these correlations have been noted. Emphasizing the idea that in *Oenothera* as well as in other organisms we are dealing with "unit" characters, Shull has concluded that all these characters, except the short styled condition of *brevistylis*, are associated in a single linkage group. In this group he has now located nine factors affecting visible characteristics, with which two zygotic lethals and two gametic lethals are assumed to be associated.

In reviewing the published data presented to demonstrate the behavior noted above, one finds considerable difficulty in harmonizing different portions of them, and is led to the conclusion that the proof for the balanced lethal hypothesis for the Oenotheras is by no means

[1] Papers from the Department of Botany, University of Michigan, No. 202.

certain. It will be the endeavor of this present paper to point out some of the discrepancies in the published results and show why they do not support that hypothesis. Thanks are due to Dr. Shull for amplifying the published data with regard to one or two points left doubtful by his publications, and also for reading the manuscript before publication.

DEMONSTRATION OF BALANCED ZYGOTIC LETHALS

To illustrate the behavior of balanced lethals, Shull (1923-a) has used a cross between *O. lamarckiana* and mut. *rubricalyx*, the former having green hypanthia, the latter red. In the first generation of this cross all the plants had red hypanthia but were of two

TABLE 1.—RESULTS OF RECIPROCAL CROSSES BETWEEN O. LAMARCKIANA AND MUT. RUBRICALYX.

CROSS	FIRST GENERATION	
	lamarckiana-like	*rubricalyx*-like
rubricalyx × *lamarckiana*	42	100
lamarckiana × *rubricalyx*	25	37
Total	67	137
Expectation (1:2 ratio)	68	136

FIRST GENERATION	SECOND GENERATION	
	Red hypanthia	Green hypanthia
9 *lamarckina*-like yielded a total of	396	0
10 *rubricalyx*-like yielded a total of	863	326

types with regard to growth habit, resembling one or the other of the parents. The second generation from *lamarckiana*-like plants bred true for red hypanthia, whereas the progeny from *rubricalyx*-like plants showed segregation into a class with red and one with green hypanthia. The actual results are reproduced in Table 1.

This cross was explained by Shull on the basis that *O. lamarckiana* carried the balanced zygotic lethals l_1 and l_2 (noted by De Vries, 1918), and that mut. *rubricalyx* carried but one of these lethals, since a homozygous form, *latifrons*, continually segregates from mut. *rubricalyx* in a 1:2 ratio (Shull 1923-b). *Latifrons* is assumed to lack lethals. These genetic constitutions will explain the composition of the first generation. But with such constitutions, both types of the F_1 of *lamarckiana* × *rubricalyx* should breed true except

for cross-overs, and with crossing over, both should show segregation. This, however, does not happen. This cross may be diagrammed as in Table 2.

From Shull's data for this cross one might assume that both l_1 and l_2 entered from the *rubricalyx* parent and only l_1 from *lamarckiana*. Diagrammed on this basis the results would be as shown in Table 3.

This arrangement allows for some of the first generation plants to breed true and others to give segregating progenies; but there are two objections to it. In the first place, this distribution of lethals is contrary to that found by De Vries for *O. lamarckiana* and by Shull (1923-b) and De Vries (1919) for mut. *rubricalyx* and the similar types, *rubrinervis* and *erythrina*. In the second place, the splitting forms should be *lamarckiana*-like and the non-splitting form should be *rubricalyx*-like. De Vries (1919) has shown that mut. *rubrinervis* carries the normal *velutina* gamete (or chromosome) of *O. lamarckiana* with its characteristic lethal l_1, but that the *typica* component has mutated to *deserens*, which lacks the lethal l_2. *Rubricalyx* is a mutation from *rubrinervis* in which the *deserens* component has mutated to a state that may be called *latifrons*. In Tables 2 and 3 the gametes are named and the factorial compositions of the gametes are listed. The genetic behavior of any combination is determined by the factorial constitution while the resemblance of any plant to *O. lamarckiana* or to mut. *rubricalyx* is presumably indicated by the chromosomes present in that plant.

Since noting the irregularities set forth above, it has been the writer's privilege to correspond with Professor Shull, who now believes the *lamarckiana* plant used in his cross had in some manner lost the lethal l_1 from the *velutina* chromosome. On this last assumption the cross appears as in Table 4.

It is a little more difficult to predict the appearances of the different genotypes on this hypothesis. Here the *velutina-velutina* combination is not eliminated by lethals, and if it reached maturity it probably would differ from *rubricalyx* in growth habit. The *typica-latifrons* combination, however, probably would resemble *lamarckiana*. In De Vries' crosses of *O. lamarckiana* and mut. *rubrinervis* (De Vries, 1919), three F_1 types were noted, *lamarckiana*, *rubrinervis*, and *lucida*, the last corresponding to the *typica-latifrons* combination of the present cross, and resembling *lamarckiana*. The *velutina-velutina* combination was lethal in De Vries' experiments.

TABLE 2.—A Diagram (Based on Shull 1923-a) Showing the Genetic Behavior of Crosses between O. lamarckiana and Mut. rubricalyx if lamarckiana carries l_1 and l_2 and rubricalyx only l_1.

Parents	Gametes	First generation	Second generation		
			Homozygous red	Heterozygous red	Homozygous green
lamarckiana × *rubricalyx*	(*velutina* rl_1) (*typica* rl_2) (*velutina* Rl_1) (*latifrons* R)	rl_1-Rl_1 (*velutina-velutina*) dies			
		rl_1-R (*velutina-latifrons*) *rubricalyx*-like	1	2	Dies
		rl_2-R (*typica-latifrons*) *lamarckina*-like?	1	2	Dies
		rl_2-Rl_1 (*typica-velutina*) *lamarckiana*-like	Dies	2	Dies

TABLE 3.—A Diagram Showing the Genetic Behavior of Crosses between O. lamarckiana and Mut. rubricalyx if l_1 is Carried by Lamarckiana and l_1 and l_2 by Rubricalyx

Parents	Gametes	First generation	Second generation		
			Homozygous red	Heterozygous red	Homozygous green
lamarckiana × *rubricalyx*	(*velutina*) rl_1 (*typica*) r (*velutina*) Rl_1 (*latifrons*) Rl_2	rl_1-Rl_1 (*velutina-velutina*) dies			
		rl_1-Rl_2 (*velutina-latifrons*) *rubricalyx*-like	Dies	2	Dies
		r-Rl_2 (*typica-latifrons*) *lamarckiana*-like?	Dies	2	1
		r-Rl_1 (*typica-velutina*) *lamarckiana*-like	Dies	2	1

TABLE 4.—A Diagram (after Shull) Showing the Genetic Behavior of Crosses between O. lamarckiana and Mut. rubricalyx if l_2 Is Carried by lamarckiana and l_1 by rubricalyx

Parents	Gametes	First generation	Second generation		
			Homozygous red	Heterozygous red	Homozygous green
lamarckiana × *rubricalyx*	(*velutina*) r (*typica*) rl_2 (*velutina*) Rl_1 (*latifrons*) R	r-Rl_1 (*velutina-velutina*)	Dies	2	1
		r-R (*velutina-latifrons*) *rubricalyx*-like	1	2	1
		rl_2-R (*typica-latifrons*) *lamarckiana*-like?	1	2	Dies
		rl_2-Rl_1 (*typica-velutina*) *lamarckiana-like*	Dies	2	Dies

The only conclusions that can be drawn from this experiment is that the data obtained do not demonstrate the action of balanced lethals. No checks were made to ascertain what lethals were present and as a result there is not one lethal factor in the cross that can be definitely recognized.

EXPERIMENTS TO SHOW LINKAGE AND CROSSING-OVER

Cross involving red hypanthia and revolute leaves.—Mut. *funifolia*, a revolute-leaved, green-budded mutation from *O. lamarckiana*, (Shull, 1921) was crossed with the flat-leaved, red-budded mut. *rubricalyx*, (Shull, 1923-b). The first generation consisted of two types, one resembling *O. lamarckiana*, the other mut. *rubricalyx*, but all had flat leaves and red hypanthia. These two types gave second generation progenies as indicated in Table 5.

TABLE 5.—F_2 FREQUENCIES IN THE CROSS MUT. RUBRICALYX × MUT. FUNIFOLIA

FIRST GENERATION	SECOND GENERATION			
	Flat leaves		Revolute leaves	
	Red hypanthia	Green hypanthia	Red hypanthia	Green hypanthia
3 *lamarckiana*-like	187	0	1	0
4 *rubricalyx*-like	277	8	4	98
1 *rubricalyx*-like	41	9	14	6

Shull's hypothesis was that mut. *funifolia*, like *O. lamarckiana*, carried both l_1 and l_2, and mut. *rubricalyx* only l_1. This assortment of lethals again brings in the same difficulties discussed under the preceding cross. Back-crosses were made with both F_1 types to the double recessive hyb. *erythrina funifolia*. As mut. *erythrina* supposedly has the same lethal factors as mut. *rubricalyx*, it would be hard to predict what lethals were carried by the hybrid *funifolia* used in this back-cross.

Since the explanation of this experiment involves crossing over between lethals and the factors for revolute leaves and red hypanthia, and since it is not known just what lethal factors are present in each case, the data are not of much significance even in showing the relation between the revolute factor and that for red hypanthia.

Cross involving red hypanthia and sulfur flower color.—When *O. franciscana* hyb. *sulfurea* was crossed with mut. *nanella* hyb. *rubricalyx* (Shull, 1923-b), the first generation consisted entirely of plants with red buds and yellow flowers. Six F_2 families gave a total of

581 plants with red hypanthia and yellow flowers, 6 with red hypanthia and sulfur flowers, 34 with green hypanthia and yellow flowers and 43 with green hypanthia and sulfur flowers. The deficiency in the sulfur-flowered classes was attributed to the presence of an egg lethal linked with the factor for sulfur flower color which had been introduced into hyb. *franciscana sulfurea* from its *O. biennis* parent when the cross was made by Davis, (Davis 1916). Davis, however, used *O. biennis* as the female parent, eliminating the possibility of the entrance of an egg lethal. Furthermore, if a pollen lethal instead were concerned, there would be 15 per cent crossing over between such a lethal and the sulfur factor. In this case the normal *O. biennis*, when imbred, should throw 15 per cent sulfur flowered forms; however, only four (Stomps 1914) sulfur flowered plants have appeared in the many thousands of *O. biennis* plants grown in culture. The zygotic lethals presumably carried by mut. *nanella* hyb. *rubricalyx* were not considered. If they were present they should decrease the number of plants in the double dominant class of the second generation and the data would be still farther from agreement with the hypothesis.

Other crosses.—In the back-cross (mut. *funifolia* × mut. *nanella* hyb. *sulfurea*) F_1 × *nanella* hyb. *sulfurea* (Shull 1923-b), neither the zygotic lethals of mut. *funifolia* nor the gametic lethal associated with sulfur flower color were considered, although the deficiency in the *nanella sulfurea* class might be explained as well by the presence of a pollen lethal as the deficient class in the preceding cross. In another cross involving revolute leaves and red stems, the zygotic lethals of mut. *funifolia* were not considered. It is possible that the *rubricalyx* plant used in the above cross did lack the zygotic lethals characteristically associated with this type, and the same may be true for the particular *funifolia* plant used, but no tests were made to determine the presence or absence of these lethals in either case.

CONCLUSIONS

In order to explain different crosses on the balanced lethal hypothesis, it has sometimes been necessary to assume that *O. lamarckiana* has both the zygotic lethals l_1 and l_2, and sometimes only one of them, apparently depending upon what cross it is in. Similarly, mut. *funifolia* must have had l_1 in some crosses and lacked it in others and mut. *rubricalyx* must at different times have carried only l_1, both l_1 and l_2, or neither. Likewise the pollen lethal as-

sociated with sulfur flower color must show crossing over with the sulfur factor or not depending upon what cross it is in. While it may be true that the zygotic lethals referred to are different in different individuals of the same type, no test has been made in any case to determine which lethals might be present, and their presence has been assumed in a cross only when it has been convenient to do so. In other cases they have been disregarded entirely. It is quite possible that there might be crossing over between the sulfur factor and the gametic lethal associated with it in some crosses and not in others if one assumes the presence of cross-over modifiers in one case —but these again have not been demonstrated.

As the experiments reviewed in this paper are the only ones thus far brought forth by Shull to prove the balanced lethal hypothesis for *Oenothera*, one must conclude that the discrepancies found demonstrate the failure of the data to support the particular form of the hypothesis that has been proposed.

It is not the purpose of this review to disprove the balanced lethal hypothesis for *Oenothera* nor to offer any alternative theory, but rather to show that the evidence thus far brought forward fails when critically examined to support this hypothesis. It is not impossible to make an adequate test of the hypothesis, but to do so one must test the genetic constitutions of the individual plants used.

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BOTANY.—*New plants from Central and South America.* S. F. BLAKE, Bureau of Plant Industry.

The new species here described, belonging to several families of Dicotyledones, have been found in the course of herbarium work during the past few years. In most cases the new species have been worked out in connection with the preparation of preliminary keys to the groups concerned.

Urtica granulosa Blake, sp. nov. Monoecious herb; stem densely incurved-puberulous, sparsely hispid; petioles slender; lower leaf blades broadly cordate-ovate, the middle and upper lanceolate, acuminate, coarsely toothed, incurved-pubescent, paler green but not canescent beneath; staminate spikes simple, about 3.5 cm. long; pistillate spikes mostly simple, 3 cm. long or less; pistillate perianth 1.8 mm. long, hispidulous, barely surpassing the ovate, whitish, granulose achene.

Stem simple, slender, probably tall, sulcate-quadrangular, densely but not canescently puberulous with incurved-ascending hairs and sparsely stimulose-hispid with spreading hairs; internodes (upper and middle) mostly 1.5–3.5 cm. long; leaves opposite; stipules linear-lanceolate, acute, puberulous, 6–8 mm. long; petioles 1–5.2 cm. long, pubescent like the stem; lower leaf blades 9.5 cm. long, 6.2 cm. wide, acute, coarsely and simply dentate (teeth about 19 pairs, deltoid, acute, about 5 mm. long), membranaceous, deep green; middle and upper leaves lanceolate, 6–11.5 cm. long, 2.5–4.5 cm. wide, often falcate, cuneate to truncate or subcordate at the often unequal base, coarsely toothed (teeth 12–21 pairs, sometimes with a lateral tooth, acute to obtuse, the terminal one elongate), above deep green, rather densely pubescent with mostly incurved hairs and sparsely hispid, beneath paler green, evenly and rather densely puberulous and sparsely hispid, 3 or 5-plinerved from near the base; axils (on upper part of plant) all floriferous, the staminate spikes below, densely flowered, 1.8–3.5 cm. long, the pistillate above, 0.5–3 cm. long, densely flowered, all hispidulous-puberulous and sparsely hispid; staminate calyx hispidulous, 1.8 mm. thick in bud; inner sepals of the pistillate calyx oval, obtuse; achene obtuse or acutish, marginate, 1.4 mm. long, 1 mm. wide.

CHIHUAHUA: In shade of cliffs, canyon below Cusihuiriachic, September 21, 1888, *Pringle* 2005 (type no. 1,167,407, U. S. Nat. Herb.); Pilares, September 22, 1891, *C. V. Hartman* 748.

Distributed as *Urtica breweri* S. Wats., which has most of the leaves broadly ovate and sepals twice as long as the achene. In leaf outline and general appearance *U. granulosa* is similar to *U. aquatica* Liebm., but in that species the finer hairs of the stem are retrorse, and the pistillate calyx is glabrous. *Urtica mexicana* Blume (not Liebm.) and *U. serra* Blume are identical with *U.*

aquatica. Material of the type collections of all three species was examined by the writer some years ago in European herbaria.

Drymaria cognata Blake, sp. nov. Very slender dichotomous annual, glandular-hirtellous on the upper part of the internodes; leaves opposite, linear, acute, 3-nerved; pedicels glabrous or glandular-hirtellous; sepals lance-elliptic, acuminate, strongly 3-nerved, glabrous, about 4 mm. long; petals and capsule shorter than the sepals.

Densely dichotomous-branched from base, or rarely nearly simple in undeveloped specimens, about 14 cm. high; internodes of the main stem usually 2–4 cm. long; leaves 9–20 mm. long, 0.8–1.5 mm. wide, acute or acuminate, sessile, glabrous, prominulously 3-nerved beneath; stipules of the stem leaves scarious, linear-subulate, entire, 0.6 mm. long; leaves mostly wanting on the branches, replaced by lance-ovate, acuminate, scarious bracts 1.2–2 mm. long, with a green midnerve; flowers solitary in the forks and at apex of branchlets, the pedicels 0.5–2.8 mm. long; sepals 3.5–4.5 mm. long, with green 3-nerved center and subequal scarious margin, 2 somewhat shorter than the other 3; petals 5, white, 3.2 mm. long, linear-oblong, 2-lobed to below the middle; stamens 5, included; ovary subglobose, about 6-ovuled; style equaling ovary, longer than the 3 stigmatic branches; capsule ovoid, obtuse, 2–3 mm. long; seeds somewhat yellowish brown, densely blunt-muriculate, 0.8 mm. long.

DURANGO: City of Durango, April–November 1896, *Palmer* 912 (type no. 304403, U. S. Nat. Herb.)

SAN LUIS POTOSI: Near City of San Luis Potosi, 1879, *Schaffner* 542 in part.

Related to *Drymaria leptophylla* (Schlecht. & Cham.) Fenzl (including *D. gracillima* (Hemsl.) Rose, according to Briquet[1]), *D. effusa* A. Gray, and *D. nodosa* Engelm. In *D. nososa* the petals are longer than the sepals; in *D. effusa* the sepals are obtusish and slightly shorter than the petals; and in *D. leptophylla* the stem is glabrous and the sepals only 2–2.8 mm. long. *Palmer* 912, type of the new species, was listed by Rose under *D. gracillima* when the latter was raised to specific rank.

Drymaria peninsularis Blake, sp. nov. Many-stemmed annual, pale green or glaucescent, glandular-hirtellous throughout; leaves opposite, linear, the upper ones reduced to bracts; inflorescences elongate, racemiform; sepals obtuse, glandular-hirtellous, white-margined; seeds fuscous.

Root annual, apparently sometimes persisting and becoming perennial; stems evidently prostrate or ascending, up to 20 cm. long, branched; internodes mostly 1–2 cm. long; stipules scarious, subulate, entire, about 0.6 mm. long; leaves linear, fleshy, obtuse, 1-nerved, sessile, the lower and middle ones 1–2.5 cm. long, 0.8–1.5 mm. wide, the upper linear, 2–4 mm. long, much shorter than the pedicels; stems floriferous from about the middle, the pedicels solitary, axillary, in fruit 4–12 mm. long, erect to deflexed; sepals 5, oval-oblong, obtuse or rounded, green with broad white petaloid margins, obscurely 1 or 3-veined, 2.8–(fruit) 4 mm. long; petals 5, white, oblong-flabellate, contracted at base, 4-fid for nearly half their length (outer lobes oblong or obovate, blunt, the inner shorter and much narrower), 3 mm. long, about equaling the sepals, persistent, slightly exserted in fruit; stamens 5, included, the

[1] Ann. Cons. Jard. Genève **13-14**: 375. 1911.

filaments subulate, glabrous, alternating with as many glands and adnate to them at base; ovary globose; style about equaling the 3 stigmatic branches; capsule 3-valved, 3–4 mm. long, equaling the sepals; seeds bluntly muriculate, reniform, 0.9 mm. long.

BAJA CALIFORNIA: Cape region, January–March 1901, *Purpus* 423 (type no. 470422, U. S. Nat. Herb.); coast south of Pescadero, Nov. 1902, *Brandegee;* Cape San Lucas, *Xantus* 5, *Brandegee* 30, *Rose* 16357.

All these specimens have been identified as *Drymaria arenarioides* Willd. In that species, which occurs in Mexico from Chihuahua to Hidalgo, the leaves are shorter and somewhat broader (mostly elliptic or linear-elliptic), the upper ones are not conspicuously reduced, and the mature seeds are much lighter brown.

Bauhinia eucosma Blake, sp. nov. High-climbing vine, unarmed; branchlets appressed-pubescent; leaves bifoliolate, the leaflets semi-ovate, obtuse, pergamentaceous, glabrous and glaucescent above, sparsely appressed-pilose beneath chiefly along the nerves, 5-nerved; racemes pilose; pedicels about 1.5 cm. long; bractlets linear; calyx campanulate, 15-nerved, 2–2.5 cm. long, the teeth subulate, short; petals sericeous, 4 cm. long; perfect stamens 10; pod 10.5 cm. long, about 4-seeded.

Older branches gray-barked, glabrous, the younger brownish-gray; internodes about 1 cm. long or less; petioles slender, glabrous or sparsely hairy, 3 to 6 cm. long; leaves deeply and narrowly cordate, the basal sinus 1 to 2 cm. deep; leaflets 5.3 to 8.8 cm. long, 2.5 to 4.3 cm. wide, broadly rounded at base, erect, somewhat overlapping, deep green above, somewhat glaucescent, brownish beneath, rather coarsely prominulous-reticulate beneath, finely so above; racemes terminal, about 6 cm. long, 6 to 9-flowered, pilose with mostly appressed rufescent hairs; bracts deciduous; pedicels 11 to 16 mm. long, pubescent like the axis, bearing above the middle two linear bractlets about 3 mm. long; calyx thick-ovoid in bud, at maturity campanulate, 5-toothed (teeth pubescent, 2 to 3.5 mm. long), rufidulous-sericeous at base and on the nerves with appressed hairs, rufid-puberulous above between the nerves with appressed hairs; corolla "white;" petals inserted at base of calyx, obovate, densely rufescent-sericeous outside, the claw about 5 mm. long, the lamina rounded at apex, 1.2 to 1.5 cm. wide; stamens 10, all antheriferous, the filaments glabrous, 1.5 cm. long, the anthers hairy, 2.8 mm. long; ovary sessile, not adnate to the calyx, densely rufous-pilose, 6-ovulate, the stigma oblique; pod oblong-obovate, flat, apiculate, sessile, rufid-pilose with appressed hairs, 10.5 cm. long, 3.2 cm. wide.

PANAMA: Along river at the Agricultural Experiment Station, Matías Hernandez, Province of Panama, September 10, 1914, *Pittier* 7682 (type no. 716839, U. S. Nat. Herb.)

A member of the section *Tylotaea*, apparently near *Bauhinia hymeneaefolia* Triana, which, according to description, has coriaceous leaves, short-pedicelled flowers, ovate-oblong calyx lobes, and only 5 antheriferous stamens. According to Mr. Pittier's notes, the shrub is known as "bejuco de cadena," and the pounded stems yield a good fibre. The dry pods are used by children as windmills, and called "runrun."

Bauhinia obovata Blake, sp. nov. Vine?, unarmed; branchlets puberulous; leaves suborbicular-ovate in outline, bilobate for one-third their length,

9-nerved, thin-coriaceous, glabrous above, rufid-puberulous beneath; racemes dense, rufid-puberulous; bracts obovate, 4 mm. long; bractlets obovate or spatulate; calyx campanulate, about 11 mm. long, 13-nerved, the teeth obovate; petals pilose, 12 mm. long; perfect stamens 10.

Branches slender, angulate, the younger densely and finely rufid-puberulous, the older glabrescent; petioles puberulous, 1.5 to 3.5 cm. long; leaves 4 to 6.5 cm. long, 4 to 8 cm. wide, shallowly cordate at base, above rather pale green, somewhat shining, beneath brownish, densely and finely puberulous with appressed, shining, rufidulous hairs, the primary nerves prominent beneath and the secondaries prominulous, the lobes somewhat incurved, obtusely short-pointed; racemes short-peduncled, rather dense, 8.5 cm. long or less, sometimes with a basal branch, densely rufid-puberulous with mostly appressed hairs; bracts usually deciduous; pedicels mostly 6 to 9 mm. long, bearing above the middle 2 bractlets about 3 mm. long; calyx broadly campanulate, densely rufid-pubescent with appressed hairs, the tube 7 to 8 mm. long, the teeth 5, obovate or spatulate-obovate, obtuse, 3.5 mm. long, 1.5 to 2 mm. wide; petals obovate, rufous-pilose outside, venose, the claw about 4 mm. long, the lamina rounded, about 5 mm. wide; stamens 10, unequal, all antheriferous, the filaments glabrous, the anthers essentially so; ovary sessile, not adnate to the calyx, densely rufous-pilose, 4-ovulate, the stigma small, oblique.

PANAMA: Along the Sambú River, southern Darien, above tide limit, February 1912, *Pittier* 5568 (type no. 715834, U. S. Nat. Herb.)

A species of the section *Tylotaea*, apparently nearest the Brazilian *B. angulosa* Vogel, which is described as having small, narrow, very caducous bracts, small setaceous bractlet, and longer petals (half an inch longer than the calyx).

Stylosanthes linearis Blake, sp. nov. Herbaceous perennial, subsimple, hirsute below; sheaths of the stipules 1–1.6 cm. long, hispid-pilose; leaflets 3, linear, 1.8–3.5 cm. long, 1.5–2 mm. wide, acuminate, hirsute-ciliate; spikes many-flowered, collected in few, remote, subglobose heads about 1 cm. high and 1.5 cm. thick; axis rudiment present; bractlets 2; basal joint of pod minute; terminal joint oblong or oval-oblong, compressed, 4–4.2 mm. long, 2.8–3 mm. wide, 2-nerved and reticulate on each side, pilosulous, the incurved-uncinate beak 1.2–1.5 mm. long.

Several-stemmed; stems rather slender, simple or subsimple below the inflorescence, 60 cm. long, erectish, sparsely hirsute below with spreadingly slightly tuberculate-based yellowish-white hairs about 3 mm. long, glabrous above; middle internodes about 8 cm. long; sheaths of the stipules sparsely hispid-pilose like the stem and sometimes pilosulous when young, the teeth subulate, stiff, 4 mm. long; petioles pilosulous and rarely hirsute, 4 to 7 mm. long, the rachis about 1 mm. long; leaflets short-petiolulate, mucronate, rounded at base, firm, obscurely puberulous along midline above, usually sparsely hirsute-ciliate and sometimes with a few stiff hairs along the costa beneath, strongly 3-nerved to apex, the veins prominent beneath, the secondaries obscure; primary bracts unifoliolate, the sheath 3.5 to 4 mm. long, densely pilose-ciliate with whitish hairs, somewhat erect-pilose dorsally, the teeth 2 mm. long, the petiolulate blade linear-subulate, ciliate below, about 3 mm. long; secondary bract 1, linear-lanceolate, ciliate, entire, about 2.5 mm. long; axis rudiment slender-subulate, stiff, long-ciliate, 0.3 to 0.8 mm. long; bractlets 2, similar to the secondary bract but longer, about 3 mm. long;

calyx 6 mm. long (including the 2.8 mm. long, stipe-like base), the lobes ciliate; corolla yellow, the banner about 6 mm. long.

ARGENTINA: Common in "esteras," Las Palmas, Terr. Chaco, 1917, *P. Jörgensen* 2693 (type no. 1,065,486, U. S. Nat. Herb.)

A member of the section *Styposanthes*, nearest *Stylosanthes longiseta* M. Micheli, known to me only from description. In that plant the heads and the upper part of the stem are setose-hispid, the leaflets are oblong (1.2 to 1.4 cm. wide), and the scarcely reticulate fruit is nearly glabrous.

Caperonia angusta Blake, sp. nov. Stem sparsely hirsute-pilose, glabrate; leaf blades linear, acute, serrulate, nearly glabrous, the lateral veins about 8 pairs; flowers short-pedicelled; staminate flowers with 5 equal sepals, 5 subequal petals, and a 3-lobed ovary rudiment; pistillate flowers with 7 or 8 unequal sparsely glandular-ciliate sepals and 5 unequal petals; capsule muricate.

Herb 60 cm. high and more (the base not seen), much branched; stem slender, striatulate, pale green, very sparsely hirsute-pilose with mostly erect or ascending eglandular hairs; main internodes 2.5 to 5 cm. long; stipules ovate, acute, persistent, 1.5 mm. long; petioles sparsely strigillose, 1.5 to 3 mm. long; blades 2.5 to 5.5 cm. long 3 to 5 mm. wide, rounded at base, serrulate with about 8 pairs of small, acute, remote teeth, rather pale green, glabrous above, beneath sparsely strigose on costa and veins or nearly glabrous, featherveined, the lateral veins about 8 pairs, straight, prominulous beneath, the secondaries barely prominulous; peduncles axillary, 5 to 15 mm. long, somewhat hirsute with erect or divergent hairs; racemes 0.8 to 2 cm. long, the lowest flower pistillate, remote from the 8 to 20 staminate flowers; bracts ovate, acute, persistent, 1 mm. long or less; pedicels of the staminate flowers about 0.5 mm. long; sepals 5, equal, ovate, acute, glabrous, 1.5 mm. long; petals 5, subequal, oblong or elliptic-obovate, rounded at apex, 1.2 mm. long; stamens 10, the anther cells subpendulous from the thickened gland-like connective; ovary rudiment distinctly 3-lobed; pedicel of the pistillate flower about 1 mm. long; sepals 7 or 8, unequal, the 3 or 4 largest ovate, acute, 2 to (fruit) 2.8 mm. long, bearing one or two long gland-tipped hairs on each margin and sometimes on the back, the 2 or 3 smallest lanceolate or lance-ovate, about 1 mm. long, the others intermediate in size and shape; petals 5, unequal, white, 1 larger, spatulate-obovate, acute, 3 mm. long, 1.2 mm. wide, the other 4 narrowly oblanceolate, 3 mm. long, 0.8 mm. wide, or sometimes all subequal, oblanceolate-obovate, 3 mm. long, short-pointed; ovary muricate; styles 5 or 6-fid for about three-fourths their length; capsule subglobose, about 3 mm. high, 4 mm. thick, muricate on the upper half, the projections ending in usually gland-tipped hairs.

PANAMA: In a spot subject to inundation, Agricultural Experiment Station, Matías Hernandez, Province of Panama, January 1–15, 1915, *Pittier* 6927 (type no. 716988, U. S. Nat. Herb.)

A member of the section *Eucaperonia*, nearest *C. panamensis* Pax & K. Hoffm., from which it differs in the more numerous sepals of the pistillate flower (5 in *C. panamensis*), these provided with a few gland-tipped cilia, the 3-lobed ovary rudiment, and other features. As the name *C. panamensis* has been used previously by Klotzsch,[2] the species described as new by Pax and K. Hoffmann[3] under this name may be renamed **C. stenomeres.**

[2] In Seem. Bot. Voy. Herald 103. 1852–57.

[3] In Engl. Pflanzenreich, Teil 4, 147[7]: 424. 1914.

Meliosma idiopoda Blake, sp. nov. Shrub or tree; branches obscurely strigillose, glabrate; petioles short-strigose, about 8 mm. long; leaf blades elliptic or obovate, acuminate at each end, chartaceous, wavy-margined but entire, essentially glabrous, about 18 cm. long; panicles subcylindric or conical, puberulous, 13–21 cm. long, 3.5–8 cm. wide; pedicels 1–1.5 mm. long; sepals somewhat unequal; petals unequal; disk nearly half as long as ovary, bearing several marginal glands.

Branches slender; leaves alternate; petioles naked, slender, 4–10 mm. long; blades falcate-acuminate, long-acuminate to the acute base, 14.5–21 cm. long, 3.8–6.5 cm. wide, obscurely strigillose along costa, densely whitish-papillose beneath, featherveined, the costa and the 8–10 pairs of lateral veins impressed or flattish above, prominent beneath, the loosely reticulate veinlets finely prominulous on both sides; panicles solitary in the axils toward apex of branches, rufid-puberulous with suberect hairs, the peduncle about 3.5 cm. long, the axis 10 to 17 cm. long, the lower branches sometimes 6.5 cm. long and much longer than the other branches, sometimes only 1.5 cm.; sepals 5, the 2 outermost oval-ovate or suborbicular-ovate, acutish to obtuse, glandular-ciliolate, otherwise glabrous, the 3 inner somewhat larger, suborbicular, rounded, glandular-ciliolate, 1.5 mm. long and wide; petals 5, unequal, 2 of the outer suborbicular, obscurely ciliolate-erose, otherwise glabrous, about 1.3 mm. long, 1.8 mm. wide, the other outer one as long but 2.5–2.8 mm. wide, the 2 inner (opposite the perfect stamens and adnate to their filaments at base) cuneate-oblong, 0.8 mm. long, broadly bifid, the teeth ciliolate; stamens 5, 3 sterile (the one adnate to the broadest petal with 2 large empty cells, the 2 adnate to the 2 other broad petals with 1 large empty cell), 2 fertile and with longitudinally dehiscent anthers; disk closely girdling ovary, bearing about 5 glandular teeth; ovary sparsely pubescent at apex, 2-celled, the cells 2-ovuled, the ovules superposed; style glabrous, entire, slightly shorter than ovary; stigmas connate.

COSTA RICA: Forests of Las Vueltas, Tucurrique, altitude 635–700 meters, May 1899, *Tonduz* 13372 (type no. 861231, U. S. Nat. Herb.)

Related to *Meliosma glabrata* (Liebm.) Urban and *M. tonduzii* Donn. Smith, both Costa Rican. Both species, according to description, are at once distinguished from *M. idiopoda* by having the style about twice as long as the ovary, in addition to various other differences.

Hypericum galinum Blake, nom. nov.

Hypericum denticulatum H. B. K. Nov. Gen. & Sp. 5: 191. *pl. 458.* 1821. Not *H. denticulatum* Walt. 1788.

Hypericum denticulatum Walt. (Fl. Carol. 190. 1788) is the tenable name[4] for the plant usually known as *H. virgatum* Lam., and the homonymous Mexican species must consequently be renamed.

Vaccinium dasygynum Blake, sp. nov. Low shrub, very leafy; branches densely griseous-pilosulous with mostly spreading hairs; leaves petioled, ovate to ovate-elliptic, 9–15 mm. long, crenate-serrulate, coriaceous, obscurely pubescent; racemes short, in the uppermost axils; flowers 4 or 5-merous; calyx tube densely pubescent, the teeth nearly glabrous; corolla campanulate-urceolate, 5.5 mm. long, glabrous; stamens 8 or 10, the filaments ciliate and pilose; anthers exaristate; tubules 1½ times as long as the sacs; young fruit densely pilose.

[4] Blake, Rhodora 17: 134. 1915.

Apparently erect; petioles pilosulous, about 2 mm. long; blades 3–10 mm. wide, obtuse or acutish, cuneate to rounded at base, marginate but not revolute, crenate-serrulate from near the base with 6–14 pairs of blunt, gland-tipped teeth, above dull green, puberulous along costa and when young sometimes on surface, beneath brownish, sparsely hirsutulous with dark hairs leaving little pits in falling, ciliolate toward base, the lateral veins about 3 pairs, impressed above and bluntly prominulous beneath or nearly obsolete on both surfaces; racemes several in the upper axils, about 7-flowered, the axis about 8 mm. long, pilosulous, the bracts suborbicular-ovate, obtuse, ciliolate, otherwise essentially glabrous, reddish, about 3 mm. long, deciduous; pedicels pilosulous, 2–4 mm. long, bearing 1–2 deciduous bractlets near base; calyx tube campanulate, 2.5 mm. long, densely griseous-pilosulous with spreading or ascending hairs, the limb 2 mm. long, the 4–5 teeth suborbicular-deltoid (1.2 mm. long), obtuse or acute, sparsely glandular-denticulate, reddish, nearly or quite glabrous; corolla (pink?) 4 mm. thick, the 4–5 deltoid, obtuse, recurved-spreading teeth 1 mm. long; stamens all alike and equal, 4.8 mm. long, the filaments distinct, ciliate, pilose within, sparsely so outside, 2.5 mm. long, the anther sacs finely muriculate, 1.2 mm. long, the 2 tubules distinct, cylindric, opening by terminal pores, 1.7 mm. long; ovary 4 or 5-celled, the cells without false partitions, the ovules numerous; style glabrous, barely exserted.

ECUADOR: Vicinity of Nabón, September 25, 1918, *J. N. Rose, A. Pachano, & G. Rose* 23017 in part (type no. 1,189,978, U. S. Nat. Herb.); vicinity of Tablón de Ona, September 27, 1918, *Rose, Pachano & Rose* 23082 in part.

Closely allied to *Vaccinium floribundum* H. B. K., in which the calyx is nearly or quite glabrous. *V. dasygynum* may prove to be only a form of that species, but seems distinct on the basis of the specimens examined. The specimens were mixed in one case with *Gaultheria reticulata* H. B. K., and in the other with *Vaccinium floribundum*.

Vaccinium retifolium Blake, sp. nov. Prostrate or reclining shrub, very leafy; stem and branches densely spreading-hirtellous; leaves short-petioled, elliptic, about 9 mm. long, acutish at each end, bluntly crenate-serrulate, veiny; flowers solitary, axillary, on pedicels 4–7 mm. long; calyx glabrous, 5-toothed; corolla broadly campanulate, 5-toothed, 7.5 mm. long and thick, glabrous throughout; stamens 12(?), all alike and equal, unappendaged; filaments distinct, hairy; anther sacs slightly longer than the tubules.

Stem branched, about 35 cm. long, rather slender; petioles 1–2 mm. long, densely hirtellous like the base of the costa; blades 7–11 mm. long, 3–4.5 mm. wide, short-ciliate toward base, otherwise glabrous, crenate-serrulate above the usually entire lower third with 3–8 pairs of obtuse, gland-tipped teeth, coriaceous, not revolute on margin, green and somewhat shining above, usually brownish or reddish beneath, feather-veined, the veins 4–5 pairs, anastomosing and usually forked toward apex, prominulous or impressed above, bluntly prominulous beneath; flowers few, solitary in the axils toward apex of stem; pedicels glabrous, somewhat thickened toward apex, bearing 2–5 ovate, acute or acuminate, coriaceous, glabrous bractlets about 1 mm. long; calyx 4 mm. long, the tube subglobose, 2 mm. long, equaling the limb, the teeth deltoid, acuminate, 1.5 mm. long, sometimes with a small glandular tooth on one side near middle; corolla thickish, the teeth slightly spreading at apex, suborbicular-deltoid, obtusish, 2 mm. long; stamens 4 mm. long,

the filaments lanceolate, 2.2 mm. long, densely hirsutulous dorsally and on margin, nearly glabrous inside, the anther sacs finely muriculate, 12 mm. long, the tubules distinct, cylindric, 1 mm. long; ovary 5-celled; style glabrous, 5 mm. long; berry globose, about 6 mm. thick, the seeds numerous in each cell.

ECUADOR: Vicinity of Portovelo, October 6–15, 1918, *J. N. Rose & G. Rose* 23387 (type no. 1,002,890, U. S. Nat. Herb.); Nabón, Sept. 25, 1918, *Rose, Pachano, & Rose* 22989.

A member of the section *Neurodesia*, allied to *Vaccinium reclinatum* Niedenzu (*V. reflexum* Hook. f., not Klotzsch) and much resembling the plate of that species, but with solitary flowers, longer corolla, and tubules nearly as long as the anther sacs. The single corolla examined had 11 stamens, with a space for a twelfth.

Macleania euryphylla Blake, sp. nov. Leafy shrub; stem cinereous-pilosulous with curved mostly spreading hairs; petioles stout, about 5 mm. long; leaf blades broadly ovate, broadly rounded at apex, broadly rounded or slightly cordate at base, about 6 cm. long; racemes fasciculiform, the axis glabrous; calyx glabrous, about 6 mm. long; corolla glabrous throughout, 1.4 cm. long; filaments ciliate; tubules of the anthers 2, connate, equaling the sacs.

Stem stout, sulcate, glabrescent on the rounded angles; internodes about 2 cm. long; petioles curved-pilosulous, 4–7 mm. long; blades 4.3 to 6.3 cm. long, 2.5–5 cm. wide, strongly coriaceous, sparsely ciliolate at base or glabrous, sparsely impressed-punctate especially above, light green above, brownish beneath, not revolute on margin, featherveined (chief lateral veins 3 pairs) and loosely prominulous-reticulate beneath, the chief veins impressed above; racemes axillary, many-flowered, the axis stout, glabrous, about 5 mm. long, the bracts suborbicular, about 3 mm. long, ciliolate, nearly or quite glabrous dorsally; pedicels stout, glabrous, about 7 mm. long, jointed at apex, bearing 2 roundish ciliolate bractlets near base; calyx campanulate, 6–7 mm. long, about 6 mm. wide, the 5 acute teeth about 1 mm. high; corolla ovoid-tubular, fleshy, probably red, 5 mm. thick below, the 5 teeth ovate, obtuse or acutish, erectish, 1.5 mm. long; stamens 10, all alike, 8.5 mm. long, the filaments distinct, flat, pilose-ciliate especially above and sparsely pilose in front and back, 2.8 mm. long, the anther sacs oblong, strongly muriculate, 3.8–4 mm. long, the tubules connate to apex, 3.8–4 mm. long, opening by elongate slits; ovary 5-celled; style glabrous, 1.8 cm. long, exserted about 4 mm.

ECUADOR: Cusatagua, near Ambato, Prov. Tunguragua, March 1919, *A. Pachano* 179 (type no. 1,033,456, U. S. Nat. Herb.).

This species enters Horold's[5] group II, A of *Macleania*. It is distinguished from most species of that group by its broadly ovate, round-tipped leaves, and from the others by characters of pubescence or dimensions. In leaves and inflorescence it is very similar to the figure of *M. cordata* Lem. (Fl. des Serres I. 4: 312. 1848), but that species is at once distinguished by having the corolla teeth pubescent inside. The vernacular name is given by the collector as "sagalita."

[5] Bot. Jahrb. Engler **42**: 269. 1909.

Forsteronia amblybasis Blake, sp. nov. Shrub or tree; branches and branchlets glabrous; leaves opposite; petioles 7–11 mm. long; leaf blades oval or elliptic-ovate, about 12 cm. long, short-pointed or subacuminate, rounded at base, glabrous except in the axils of the veins, pergamentaceous, the chief lateral veins 4–6 pairs; panicles puberulous, slender, the primary branches short, the flowers glomerate, subsessile; calyx eglandular, the sepals oblong, obtuse, 2 mm. long, finely ciliolate; corolla 3.5 mm. long, the lobes ovate-oblong, 2.2 mm. long, sparsely puberulous outside, densely pilose-barbate inside especially toward apex.

Branches and branchlets (the latter dull brown) conspicuously lenticellate; petioles slender, naked, glabrous or slightly puberulous; blades 9.5–13 cm. long, 3.5–6 cm. wide, mucronulate at the obtuse or acute apex, usually broadly rounded at base, dull or somewhat shining green above, brownish green especially along the nerves beneath, the costa and chief lateral veins impressed above, prominent beneath and with incomplete barbatulate cups in the axils, the veinlets prominulous above, scarcely so beneath; panicles terminal and in the upper axils, densely spreading-puberulous when young, sparsely so when old, the peduncle 1.4–4.5 cm. long, the axis 7–19 cm. long, the branches few, subopposite, 4.5 cm. long or less, the flowers collected in glomerules toward their tips, and at apex of panicle interrupted-glomerate, the glomerules 7–10 mm. thick; bracts oblong, about 3.5 mm. long, apiculate, ciliolate, otherwise nearly glabrous; pedicels puberulous, about 1.3 mm. long or less; sepals oblong or ovate-oblong, 2–2.2 mm. long, obtuse or acute, finely puberulous on middle of back or essentially glabrous except for the ciliolate margin; corolla campanulate, the 5 lobes suberect, the tube 1.3 mm. long, densely annulate-barbate inside near middle, the lobes obtuse; stamens 1.8 mm. long, the filaments about half as long as the anthers, the anthers glabrous outside, their tails thickened, truncate; nectary 5-lobed; ovaries hispidulous at apex.

BOLIVIA: Tipuani to Guanai, December 1892, *M. Bang* 1689 (type no. 1,167,408, U. S. Nat. Herb.); Polo-Polo near Coroico, North Yungas, altitude 1100 m., October-November 1912, *O. Buchtien* 3953.

Both these collections were distributed as *Forsteronia sellowii* Muell. Arg., to which species *F. amblybasis* seems to be nearest. In that South Brazilian plant, however, according to Mueller's description, the leaves are subacute at base and considerably smaller, the panicle is glabrous, the calyx and corolla are somewhat smaller, the corolla is fulvo-puberulous outside, its lobes are merely hispidulous inside, and the anthers are hispidulous on the back above.

Fischeria boliviana Blake, sp. nov. Vine, densely and finely glandular-hirtellous and rather densely spreading-hirsute; leaf blades oval-obovate, short-pointed, narrowly cordate at base, densely and finely pilosulous on both sides; peduncles mostly exceeding the leaves; flowers numerous, 1.8 cm. wide; sepals lanceolate, acuminate, puberulous and hirsute, about ¾ as long as the corolla; corolla lobes oblong-ovate, obtuse or acutish, pubescent on both sides, not distinctly ciliate, crisped on one side.

Stem and branches rather stout; leaves opposite; petioles pubescent like the stem, 1.5–2.2 cm. long; blades (only the upper seen) 5–6.5 cm. long, 3–3.8 cm. wide, abruptly short-pointed (the point about 2 mm. long), narrowly cordate at base (the sinus usually open, about 4 mm. deep), papery, above light green, densely and softly spreading-pilosulous (the hairs with barely enlarged base), beneath brownish green, similarly pubescent with shorter

hairs and along the veins sparsely hirsute, hirsute on margin, feather-veined, the lateral veins about 6 pairs; peduncles solitary, axillary, pubescent like the stem, 3–6 cm. long; inflorescences umbelliform or shortly racemose, similarly pubescent; pedicels 1.1–1.6 cm. long; buds apiculate; sepals 7 mm. long, 1.5–2 mm. wide below, reflexed; calycine glands small, easily deciduous; corolla deeply 5-parted, the lobes hispidulous-puberulous outside, hirsute-pilose inside except along the sulcate-plicate glabrous midline, 8 mm. long, 4.5 mm. wide; outer corona fleshy, adnate to base of corolla and to gynostegium, about ⅔ as long as the latter; inner corona of 5 fleshy, oval, rounded lobes equaling the gynostegium, their inner margins prolonged into deltoid obtuse lobes applied to the apex of the disk of the gynostegium.

BOLIVIA: Beni River, July 1886, *Rusby* 936 (type no. 32499, U. S. Nat. Herb.)

Related to *Fischeria calycina* Decaisne, which is described as with peduncles equaling the leaves, and lanceolate attenuate merely puberulous corolla lobes; also related to *F. peruviana* Decaisne, which is said to have only a few scattered hairs on the inner surface of the corolla lobes, while those of *F. boliviana* are rather densely hirsute-pilose inside.

Fischeria funebris (Donn. Smith.) Blake.

Fischeria martiana var. *funebris* Donn. Smith, Bot. Gaz. **24**: 398. 1897.

Stem densely and minutely subglandular-puberulous and less densely spreading-hirsute; petioles similarly pubescent; leaf blades oval-ovate to obovate, usually rather long-acuminate, cordate at base, papery, densely hirsute-pilose or hirsutulous above (the hairs longer along the costa), beneath brownish, densely and rather softly hirsute-pilose or pilosulous (the hairs longer along the veins); peduncles longer than the leaves; inflorescences umbelliform, becoming short-racemose; pedicels 2–3.5 cm. long; buds very obtuse; sepals narrowly lance-subulate, attenuate, 9–15 mm. long, distinctly exceeding the corolla, puberulous and hirsute; calycine glands present; corolla about 1.8 cm. wide, deeply 5-lobed, fleshy, the lobes ovate, obtuse, strongly plicate-crisped on one side, somewhat crisped toward apex on the other side, not sulcate-plicate along midline except at extreme base, hirsutulous on both surfaces except toward margin and apex; outer corona fleshy, subentire, about half as long as gynostegium; inner corona of 5 fleshy, obtuse lobes surpassing the gynostegium, their inner margins prolonged into suborbicular appressed lobes.

GUATEMALA: Between Sepacuité and Secanquim, Alta Verapaz, altitude 400 m., May 18, 1905, *Pittier* 311.

COSTA RICA: Hacienda Veyta, Río Volcán, Valley of Diguis, Feb. 12, 1898, *Pittier* 12065; Las Vueltas, Tucurrique, altitude 600–700 m., Jan. 1899, *Pittier* 13182; Finca de Chirripò, plains of Zent, altitude 200 m., Feb. 1900, *Pittier* 16054; Río Honda, altitude 50 m., Feb. 15, 1903, *Pittier*, 16641.

This plant is clearly a distinct species from the Brazilian *Fischeria martiana* Decaisne, which is described as having larger flowers, sepals equaling the corolla, acute buds, and a white corolla veined with green, its lobes sulcate-plicate along the midline. In *F. funebris* the corolla appears to be densely veined with dark on a light ground.

ORNITHOLOGY.—*Descriptions of new Treronidae and other non-passerine birds from the East Indies.* HARRY C. OBERHOLSER, Biological Survey.

Further evidence of the richness and value of Dr. W. L. Abbott's East Indian bird collections for the United States National Museum is furnished by the following new birds. The names of colors used in these descriptions are from Ridgway's *Color standards and color nomenclature.*

ARDEIDAE

Butorides javanicus carcinophonus, subsp. nov.

Subspecific characters.—Similar to *Butorides javanicus javanicus*, from Java, but larger, and somewhat lighter on neck and under surface.

Description.—Type, adult female, no. 182229, U. S. Nat. Mus.; Pulo Alanga, eastern Borneo, May 12, 1913; Dr. W. L. Abbott. Forehead greenish slate; pileum and crest deep slate green, the tip of the crest more slaty; the middle of the crown dark ivy green, slightly metallic; cervix mouse gray; upper back brownish neutral gray; remainder of back and its plumes light grayish olive, the edges and tips of the feathers glaucous; rump and upper tail-coverts deep mouse gray; tail deep slate olive, somewhat metallic; wings slate color, the exposed outer parts of the webs of the feathers dark ivy green; anterior lesser coverts more brownish and duller, the edgings buffy white, cinnamon buff, and sayal brown; middle of the chin mostly creamy white; sides of chin and of neck, together with the throat and jugulum, rather brownish mouse gray, the middle of the lower jugulum paler; breast, sides, flanks, and crissum, neutral gray, the breast washed with brownish; abdomen pale grayish buff; lining of wing light neutral gray.

Measurements of type.—Wing, 168.5 mm.; tail 63; exposed culmen, 64; height of bill at base, 12; tarsus, 45; middle toe without claw, 40.5.

Butorides javanicus carcinophilus, subsp. nov.

Subspecific characters.—Similar to *Butorides javanicus carcinophonus*, from Borneo, but lower parts paler.

Type.—Adult female, no. 201671, U. S. Nat. Mus.; Casiguran, Luzon Island, Philippine Islands, June 1, 1907; Dr. E. A. Mearns; original number, 15262.

Measurements of type.—Wing, 161 mm.; tail, 57; exposed culmen, 62; height of bill at base, 12.5; tarsus, 44; middle toe without claw, 41.

MEGAPODIIDAE

Megapodius forsteni balukensis, subsp. nov.

Subspecific characters.—Similar to *Megapodius forsteni forsteni*, of the Molucca Islands, but having the upper surface darker and more rufescent, the cervix more or less overlaid with brown; lower parts darker; and size slightly smaller.

Description.—Type, adult female, no. 200692, U. S. Nat. Mus., Baluk, Baluk Island, Sulu Sea, Philippine Islands, January 10, 1906; Dr. E. A. Mearns. Pileum dull olive brown; upper cervix deep mouse gray, slightly washed with olive brown; lower cervix, together with the rump, back, and

scapulars, dark prouts brown; upper tail-coverts and tail, clove brown; wings rather rufescent clove brown, the edgings of tertials, of inner greater and middle coverts, like the back, the lesser coverts and remaining portion of the other coverts, chaetura drab; sides of head, together with chin and upper throat, mouse gray; sides of neck, together with remaining lower parts and lining of wing, deep mouse gray, the abdomen washed with olive brown.

Measurements of type.—Wing, 211 mm.; tail, 73.5; exposed culmen, 22.5; height of bill at base,; 10; tarsus, 61.5; middle toe without claw, 40.

This island race is apparently still more different from *Megapodius forsteni cumingii* of the island of Palawan, in the Philippine Archipelago, being very much darker both above and below.

RALLIDAE

Hypotaenidia striata paraterma, subsp. nov.

Subspecific characters.—Similar to *Hypotaenidia striata striata*, from the Philippine Islands,[1] but much darker above, the ground color more extensively and deeply blackish, the edgings also more deeply colored, and the white spots on hind neck, back, and rump much fewer and smaller; lower parts somewhat darker; and white bars on flanks and sides much narrower and farther apart.

Description.—Type, adult female, no. 161078, U. S. Nat. Mus.; Samar Island, Philippine Islands, April 18, 1888; F. S. Bourns. Pileum and upper cervix, bay, somewhat blackish medially; remaining upper parts brownish black barred with white, the edgings of the feathers varying from saccardo umber to sepia; chin creamy white; sides of head and the greater part of the sides of the neck, together with the throat and breast, between neutral gray and mouse gray, the breast washed with olive brown; primaries and secondaries between fuscous black and fuscous; the rest of the wings and the remaining portion of the under surface colored like the back; lining of wing brownish black, barred with white.

Measurements of type.—Wing, 114, mm.; tail, 45; exposed culmen; 38; tarsus, 34; middle toe without claw, 37.

This new race is of interest since it differs apparently so much from the typical form of the species, which inhabits the other islands of the Philippine Archipelago,—Luzon, Siquijor, Panay, and others. It is, in fact, as dark as *Hypotaenidia striata obscurior* Hume, of the Andaman Islands, but is distinguishable by smaller size; by rather broader more widely spaced white bars on sides and flanks; and by larger white spots and wider white bars on the upper parts.

The original *Hypotaenidia striata striata*[2] came from the Philippine Islands, but had no more definite locality assigned. Since it is desirable now to have an exact type locality, we will designate this as Manila, on the island of Luzon, from which the original specimen probably came.

[1] Type locality: Manila, Island of Luzon, Philippine Islands.

[2] [*Rallus*] *striatus* Linnaeus, Syst. Nat., ed. 12, 1: 262. 1766 (after May 24). "Philippinis".

TRERONIDAE

Muscadivores aeneus arhadius, subsp. nov.

Subspecific characters.—Similar to *Muscadivores aeneus aeneus*, from Borneo, but with tail more greenish; cervix, top and sides of head averaging more grayish.

Description.—Type, adult female, no. 180106, U. S. Nat. Mus.; Kateman River, eastern Sumatra, September 3, 1903; Dr. W. L. Abbott. Top and sides of head, light grayish vinaceous, the crown overlaid with gull gray; cervix gull gray; chin, extreme anterior part of forehead, and orbital ring, creamy white; remaining upper parts metallic bluish green with a strong bronzy sheen; tail bluish green with a slight metallic gloss, the middle pair of rectrices most decidedly blue; tertials metallic green like the back; primaries and secondaries, fuscous on the basal two-thirds of inner half of inner webs, glaucous greenish slate color on the remaining portion, the outer vanes of the secondaries with more or less metallic green gloss; primary coverts and exterior greater coverts greenish slate, with some metallic green on their outer webs; rest of upper wing-coverts metallic green like the back; throat pale grayish vinaceous; jugulum gull gray; breast and abdomen, light grayish vinaceous; sides of the same shade, but overlaid and tinged with gull gray; flanks gull gray; crissum dark bay; lining of wings between gull gray and deep gull gray.

Measurements of type.—Wing, 228 mm.; tail, 140; exposed culmen, 23.5; tarsus, 31; middle toe without claw, 37.

Haemataena melanocephala enantia, subsp. nov.

Subspecific characters.—Similar to *Haemataena*[3] *melanocephala bangueyensis*, from Mindanao, but with yellow of throat darker; yellow of middle of lower abdomen paler, showing thus more contrast to the crissum.

Description.—Type, adult male, no. 191872, U. S. Nat. Mus.; Cagayan Sulu Island, Philippine Islands, February 26, 1904; Dr. E. A. Mearns. Head and throat, pale gull gray, but the forehead, sides of head, sides of throat, and the middle of the lower throat, between light gull gray and pallid neutral gray, with a large black patch on the occiput; chin and upper throat, between light cadmium and lemon chrome; cervix and sides of neck, warbler green, shading a little to citrine on the upper back and scapulars; lower back, rump, and upper tail-coverts, cerro green; tail-feathers basally and, excepting the middle pair, also on marginal portion of inner webs, fuscous, the remaining portion of the feathers somewhat metallic green, between scheele's green and grass green, some of the feathers bronzy, and having on the two middle rectrices numerous narrow, almost invisible, bronzy bars; wings fuscous, the superior coverts and the exposed portion of the quills (except the secondaries) in the closed wing somewhat metallic olive green, cerro green, bronzy green, and dark green, all mingled together, the general effect being nearly olive green; secondaries between scheele's green and grass green; jugulum and breast, between cerro green and spinach green, and shading to between parrot green and grass green on abdomen, sides, and thighs; lower abdomen empire yellow, verging slightly toward apricot yellow; crissum chrome yellow to cadmium yellow, the longest middle lower tail-coverts mostly rose red; lining of wing neutral gray, outwardly mostly cerro green.

[3] For the use of this generic name instead of *Spilotreron* Salvatori, *cf.* Richmond, Proc. U. S. Nat. Mus. **53**: 593. 1917.

Measurements of type.—Wing, 119 mm.; tail, 77; exposed culmen; 55.5; tarsus, 22; middle toe without claw, 22.5.

This new race is apparently confined to the island of Cagayan Sulu.[4]

Treron curvirostra erimacra, subsp. nov.

Subspecific characters.—Resembling *Treron curvirostra nasica*, from Borneo, but much larger, and, in the male, of lighter coloration.

Description.—Type, adult male, no. 201778, U. S. Nat. Mus.; Balabac Island, Philippine Islands, October 16, 1906; Dr. E. A. Mearns. Pileum slate gray, lightening to rather dark gull gray on the forehead; cervix between deep grape green and pois green; cervical collar deep gull gray; middle of back purple drab; remainder of back, together with the scapulars, dull, dark corinthian purple; rump olive green; upper tail-coverts warbler green; middle tail-feathers dark citrine; basal portion of the remaining tail-feathers slate gray, the subterminal portion black, the tip dark gull gray; wings black, slightly brownish; but the tertials olive green, the bend of the wing slate gray, slightly washed with olive, the lower rows of lesser coverts andover green, the edgings of the wings lemon yellow; sides of neck and of face like the cervix; chin and throat, lime green; jugulum yellowish citrine; breast grape green; abdomen grape green shading to asphodel green, darker laterally, and passing into slate gray on the sides of the body; flanks and thighs, calla green mixed with creamy white; lower tail-coverts between sayal brown and ochraceous tawny; lining of wing slate gray.

Measurements of type.—Wing, 137 mm.; tail, 88.5; exposed culmen, 17; height of bill at base, 7.5; tarsus, 22; middle toe without claw, 23.

This is the bird that has been commonly recorded from the Philippine Islands as *Treron nipalensis*, but it is readily distinguishable from the bird from Borneo, which is clearly a subspecies of *Treron curvirostra*, as well as from the typical race of the Malay Peninsula.[5] From the latter it differs in both sexes in its darker coloration, particularly on the upper parts.

Dendrophassa vernans nesophasma, subsp. nov.

Subspecific characters.—Similar to *Dendrophassa vernans vernans*, from Luzon Island, Philippine Islands, but in both sexes paler throughout and with the green of upper parts averaging more grayish.

Description.—Type, adult male, no. 191947, U. S. Nat. Mus.; Cottabata, Mindanao Island, Philippine Islands, March 3, 1904; Dr. E. A. Mearns. Pileum between hathi gray and cinereous; forehead dark pearl gray; cervix between pale and light vinaceous drab, washed with plumbeous medially; interscapulum and rump, deep grape green, the scapulars between courge green and light hellebore green; upper tail-coverts isabella color, gradually verging into the grape green of rump; tail slate gray, with a broad subterminal band of black, and tipped narrowly with slate black; wing-quills, except the tertials, slate black, the outer primaries brownish black distally, all the quills

[4] For a list of the other subspecies of *Haemataena melanocephala*, *cf.* Oberholser, Proc. U. S. Nat Mus. **54**: 192. 1917.

[5] For the change of specific name from *Treron nipalensis* to *Ireron curvirostra* (Gmelin), *cf.* Oberholser, Smithson. Misc. Coll. **60**: no. 7: 3, footnote. 1912. The type locality of *Columba curvirostra* Gmelin is there designated as "Malay Peninsula"; we here further restrict it to the *town* of Malacca.

shading inwardly into slate gray basally; tertials and superior wing-coverts, between courge green and light hellebore green, the bend of wing washed with plumbeous, the greater coverts and tertials conspicuously margined distally on their outer webs with picric yellow; chin, throat, and sides of head, between dawn gray and pearl gray; jugulum like the cervix, but not washed with plumbeous; middle of breast between ochraceous orange and yellow ochre; lower breast and upper abdomen, lime green, darker and duller laterally, sides deep gull gray; lower abdomen pinard yellow; flanks partly lincoln green, partly deep grape green, broadly streaked with pinard yellow; crissum rather light auburn; lining of wing deep gull gray.

Measurements of type.—Wing, 148 mm.; tail, 92; exposed culmen, 17; tarsus, 22; middle toe without claw, 23.

In addition to Mindanao, this race occupies at least the islands of Basilan, Jolo, and Sulu.

Dendrophassa vernans abbotti,[6] subsp. nov.

Subspecific characters.—Resembling *Dendrophassa vernans vernans*, from Luzon Island, Philippine Islands, but in the male darker and duller above; in the female darker, duller, less greenish above, duller, less greenish or less yellowish below, the abdomen usually paler, and medially often even whitish.

Type.—Adult male, no. 153653, U. S. Nat. Mus.; Tyching; Trang, Lower Siam (Malay Peninsula), June 2, 1896; Dr. W. L. Abbott.

Measurements of type.—Wing, 140.5 mm.; tail, 90; exposed culmen, 15.5; tarsus, 22; middle toe without claw, 24.5.

This subspecies ranges apparently over all the Malay region, from Singapore to Siam.

Dendrophassa vernans zalepta, subsp. nov.

Subspecific characters.—Similar to *Dendrophassa vernans vernans* of Luzon Island, Philippine Islands, but decidedly smaller.

Type.—Adult male, no. 248190, U. S. Nat. Mus.; Kwala Besar, Celebes, August 24, 1914; H. C. Raven; original number, 1538.

Measurements of type.—Wing, 137 mm.; tail, 81; exposed culmen, 16.5; tarsus, 20.5; middle toe without claw, 23.5.

This new form is distinguishable from *Dendrophassa vernans nesophasma*, of the southern Philippine Islands, by reason of much smaller size, and somewhat darker coloration. It appears to be confined to the island of Ceebes.

Dendrophassa olax arismicra, subsp. nov.

Subspecific characters.—Similar to *Dendrophassa olax olax*, from Sumatra, but much smaller; and upper parts darker, particularly the rump and pileum.

Description.—Type, adult male, no. 181777, U. S. Nat. Mus.; Segah River, northeastern Borneo, November 23, 1912; H. C. Raven; original number, 429. Pileum, cervix, sides of head and of neck, rather dark slate gray, paling to gull gray on forehead; upper back dark vinaceous brown; rest of back, together with the scapulars, haematite red; rump and upper tail-coverts, blackish slate; tail dull black, the tip rather deep neutral gray; wings dull black, the inner webs of the quills brownish; the outer edges of the secondaries, together with the greater coverts and outer middle coverts, marguerite yellow, the lesser coverts and exposed portion of the inner median coverts, haematite

[6] Named for Dr. W. L. Abbott.

red, middle of chin dull white; sides of chin, together with the throat, slate gray, lighter medially; jugulum raw sienna; breast between oil yellow and pyrite yellow; abdomen vetiver green; sides slate gray, washed inferiorly on the anterior portion with the color of the breast, on the posterior portion with vetiver green; flanks blackish slate, mixed with tawny and washed anteriorly with vetiver green; thighs tawny; crissum between auburn and chestnut; lining of wings blackish slate.

Measurements of type.—Wing, 114.5 mm.; tail, 71.5; exposed culmen, 13.5; height of bill at base, 5; tarsus, 19; middle toe without claw, 20.5.

This new subspecies is evidently not the same as *Dendrophassa olax hageni*[7] from northeastern Sumatra, since that bird is described as paler than *Dendrophassa olax olax*, while the Borneo birds are darker than the typical race.

Butreron capellei messopora, subsp. nov.

Subspecific characters.—Similar to *Butreron capellei passorhina* Oberholser from Pulo Mata Siri, but pileum more greenish (less grayish); upper parts darker; greenish areas of lower surface, except the flanks, darker; breast and abdomen more yellowish as well as darker.

Description.—Type, adult male, no. 181425, U. S. Nat. Mus.; Klumpang Bay, southeastern Borneo, January 22, 1908; Dr. W. L. Abbott. Forehead olive gray, lighter anteriorly, and washed all over with greenish; crown greenish gray, washed with greenish; hind neck vetiver green, slightly tinged with citrine; scapulars the same; back and rump, darker, between vetiver green and andover green; upper tail-coverts dull vetiver green; broad tips of middle pair of rectrices between light yellowish olive and mignonette green, remainder of exposed portion deep grape green, and the basal concealed portion deep gull gray, more or less washed with the same green; the remaining rectrices dusky neutral gray, basally deep gull gray on outer vanes, light neutral gray on the inner, and terminally pale neutral gray, the two pairs next to the middle pair washed with the green of the middle feathers, particularly on the outer webs, the outer rectrices also very slightly and narrowly tinged with the same on the outer margins of their gray tips; wings slate color, but the outer webs of the tertials and most of the lesser wing-coverts (excepting only those along the bend of the wing), together with a few of the inner middle coverts, between andover green and vetiver green like the scapulars; narrow edgings on outer webs of the inner middle coverts and some of the inner greater coverts, lemon yellow; and similar, but much broader, edgings on the two innermost greater coverts and on the outermost tertial and innermost secondary, lemon chrome; lores pale greenish olive gray; superciliary region, a narrow orbital ring, and the anterior malar region, greenish gray; remaining parts of the sides of the head, together with the sides of the neck, vetiver green; anterior part of chin between a dark yellowish glaucous and seafoam yellow, posterior portion of chin and middle uppermost part of throat, between dark citrine green and water green, middle of rest of throat rather dark lime green; a broad band on the jugulum yellow ochre, shading laterally to buckthorn brown; breast and abdomen between mignonette green and lime green; sides of body between tea green and water green; flanks between light slate olive and rather light sage green; shorter lower tail-coverts of the same green color, but mixed with feathers of cartridge buff

[7] *Osmotreron olax hageni* Parrott, Abhandl. K. Bayer. Akad. Wiss. II Kl. **24**: abt. 1: 266. Nov. 6, 1907 ("Umgegend von Deli" [Sumatra]).

and pinkish buff, and some of the green feathers broadly tipped with the same buff; rest of lower tail-coverts hays brown; thighs partly dull green like the abdomen, partly cartridge buff; lining of wing partly slate gray, partly dark gull gray.

Measurements of type.—Wing, 193 mm.; tail, 128; exposed culmen, 25.5; height of bill at base, 10.5; tarsus, 26; middle toe without claw, 29.

Butreron capellei panochra, subsp. nov.

Subspecific characters.—Resembling *Butreron capellei messopora,* from Borneo, but upper and lower parts, excepting the crissum, lighter.

Type.—Adult male, no. 181058, U. S. Nat. Mus.; Besitan River, eastern Sumatra, February 8, 1906; Dr. W. L. Abbott.

Measurements of type.—Wing, 199.5 mm.; tail, 133; exposed culmen, 25; height of bill at base, 10.5; tarsus, 28; middle toe without claw, 31.

This race may be distinguished from *Butreron capellei magnirostris* of the Malay Peninsula by its lighter, more grayish (less greenish) upper parts, particularly the forehead; and lighter, more grayish (less greenish) lower surface (excepting the orange rufous pectoral band of the male).

The recognizable races of *Butreron capellei* are now five, as follows:

1. *Butreron capellei capellei* (Temminck). Java.
2. *Butreron capellei passorhina* Oberholser. Pulo Mata Siri, in the Java Sea.
3. *Butreron capellei messopora* Oberholser. Borneo.
4. *Butreron capellei panochra* Oberholser. Sumatra.
5. *Butreron capellei magnirostris* Strickland. Malay Peninsula.

CUCULIDAE

Surniculus lugubris massorhinus, subsp. nov.

Subspecific characters.—Similar to *Surniculus lugubris lugubris* of Java, and to *Surniculus lugubris dicruroides* of Nepal, but larger than either.

Description.—Adult female, no. 181212, U. S. Nat. Mus.; Siak River, eastern Sumatra, January 3, 1907, Dr. W. L. Abbott. Pileum metallic greenish slate black; cervix metallic bluish black; mantle metallic deep slate green; lower back, rump, tail, and wings, like the pileum, but the rump a little more greenish, the inner edges of the wing-quills fuscous, the tertials and superior wing-coverts, except the primaries and the outer greater and middle series, metallic deep slate green; lores and sides of head black, the latter with a metallic bluish or greenish sheen; sides of neck metallic bluish black; crissum metallic deep slate green, barred with dull white; remaining lower parts, together with the lining of wing, brownish black with a dull metallic greenish sheen.

Measurements of type.—Wing, 143 mm.; tail, 135; exposed culmen, 23; tarsus, 17; middle toe without claw, 15.3.

BUCEROTIDAE

Hydrocissa convexa barussensis, subsp. nov.

Subspecific characters.—Like *Hydrocissa convexa convexa,* from Sumatra, but larger, the length of wing much over 300 mm.[8]

[8] Measured *without* straightening the quills.

Description.—Type, adult, sex unknown, no. 179786, U. S. Nat. Mus.; Tana Bala Island, Batu Islands, in the Barussan Chain, western Sumatra, February 11, 1903; Dr. W. L. Abbott. Breast, and remainder of posterior lower parts, tail (excepting the two middle feathers), a short narrow patch on edge of wing, a bar across the extreme bases of primaries and secondaries, and broad tips of the same feathers, white; all the rest of the plumage black with a metallic greenish, in places purplish, sheen; bill ivory white, but the base of mandible, the posterior end of the casque, and a broad irregular stripe extending from the anterior point of the casque diagonally backward and downward to the middle of the base of the casque, black; "iris crimson brown; orbital skin and throat bluish white, deepest round eye; ear dull cobalt; feet gray black."

Measurements of type.—Wing,[9] 315 mm.; tail, 289; culmen from nostril, 145; height of bill (without casque) at nostril, 46; length of casque, 152; height of casque at nostril, 42; tarsus, 54; middle toe without claw, 43.

Birds of this species from the other islands of the Barussan Chain seem to be the same as those from Sumatra and Borneo. The wing in twelve specimens of *Hydrocissa convexa convexa* from Sumatra, Borneo, and the Barussan Islands measures 275–305 mm., with an average of 288 mm.

PICIDAE

Meiglyptes tukki hylodromus, subsp. nov.

Subspecific characters.—Similar to *Meiglyptes tukki tukki*, from Sumatra, but with light bars of upper and lower parts, particulary the former, less uniform and less extensive, therefore less conspicuous.

Description.—Type, adult male, no. 180846, U. S. Nat. Mus.; Mojeia River, Nias Island, Barussan Islands, western Sumatra, March 10, 1905; Dr. W. L. Abbott. Pileum between olive brown and chaetura drab; remainder of upper surface, including the scapulars, between olive brown and deep olive, barred with dark olive buff; tail olive brown, with lighter bars between cinnamon buff and isabella color; exposed surface of wings olive brown, the primaries and secondaries with fuscous bars of the same color as those on the tail, but the bars on the innermost webs cartridge buff; sides of head between hair brown and deep grayish olive; a streak on the side of the neck creamy buff; malar strip brazil red; chin dull cream buff, barred with light brownish olive; upper throat dull buffy white, barred with blackish brown; lower throat and jugulum brownish black, posteriorly barred with dull buffy; posterior lower parts between buffy brown and deep olive, barred with pale dull buffy, lining of wing cream buff.

Measurements of type.—Wing, 94 mm.; tail, 61; exposed culmen, 20.5; height of bill at base, 8; tarsus, 20; middle toe without claw, 16.

This new race is so very much smaller than *Meiglyptes tukki calceuticus*, of the neighboring Banjak Islands, that there is no difficulty in distinguishing it from that form.

Meiglyptes tukki percnerpes, subsp. nov.

Subspecific characters.—Similar to *Meiglyptes tukki tukki*, from Sumatra, but with lower parts paler and duller, the light bars there usually less sharply

[9] Measured *without* straightening the quills.

contrasted to the dark areas; black jugular band somewhat narrower; upper surface much paler, more brownish (less grayish), its light bars more ochraceous, and on the back rather broader.

Type.—Adult male, no. 181636, U. S. Nat. Mus.; Batu Jurong, southwestern Borneo, June 22, 1908; Dr. W. L. Abbott.

Measurements of type.—Wing, 99 mm.; tail, 65; exposed culmen, 21; height of bill at base, 8; tarsus, 21; middle toe without claw, 15.

PHODILIDAE

Phodilus badius abbotti[10], subsp. nov.

Subspecific characters.—Similar to *Phodilus badius badius*, of Java, but somewhat larger, and with upper parts and legs paler.

Description.—Type, adult, sex unknown, no. 172948, U. S. Nat. Mus.; Province Wellesley, Federated Malay States, western Malay Peninsula, 1899; Dr. W. L. Abbott. Forehead between light vinaceous fawn and vinaceous buff; crown, occiput, upper cervix, back, rump, and upper tail-coverts, between tawny and russet brown, spotted with dark brown; a collar on the lower cervix, together with the outer scapulars, bright ochraceous tawny, spotted with dark brown; tail russet, barred with black; wings russet, the lesser coverts mixed with ochraceous tawny along their median line and spotted with dark brown; face like the forehead, but the fringe all along the eyes, except on the outside, russet, mixed with rather reddish mars brown; a narrow collar on the throat rather reddish mars brown; below this a collar of creamy white; rest of lower parts like the forehead, but breast, sides, and flanks, mixed with a color between yellow ochre and ochraceous buff; thighs between pinkish cinnamon and clay color, paler on the inside; under wing-coverts dull white, tinged with buffy, the middle of these coverts russet.

Measurements of type.—Wing, 192 mm.; tail, 85; exposed culmen, 26; height of bill at base, 17; tarsus, 42; middle toe without claw, 33.

BUBONIDAE

Strix leptogrammica nyctiphasma, subsp. nov.

Subspecific characters.—Like *Strix leptogrammica myrtha* of Sumatra, but with face and forehead lighter, and the posterior lower parts darker, more rufescent, the dark bars therefore less distinct.

Description.—Type, adult male, no. 179099, U. S. Nat. Mus.; Pulo Bangkaru, Banjak Islands, Barussan Islands, western Sumatra, January, 1902; Dr. W. L. Abbott. Forehead russet, paler anteriorly; crown, occiput, and upper cervix, dark, rather rufescent bone brown; superciliary stripe and lower cervix between sanford brown and hazel, mixed to some extent with the paler color of the bases of the feathers; upper back between deep mars brown and warm sepia; back, rump, upper tail-coverts, and scapulars, between tawny and cinnamon brown and a lighter shade of the same, barred with the color of the crown, but the outer scapulars pale buff; wings and tail like the crown, barred with brown, varying from the color of the back to pale pinkish buff; lores dull white, the tips of the feathers blackish; ear discs like the superciliary stripe, but paler and mixed with whitish on their posterior edges; posterior auricular region like the crown; sides of neck, together with the chin, throat, and jugulum, brown like the superciliary stripe; remainder of lower

[10] Named for Dr. W. L. Abbott.

parts, including the thighs and the lining of the wings, cinnamon buff, but the crissum paler, the thighs darker, and all except the sides of the body barred with the brown color of the crown.

Measurements of type.—Wing, 293 mm.; tail, 176; exposed culmen, 30.5; culmen from cere, 23; height of bill at base, 23; tarsus, 46; middle toe without claw, 35.

This new owl has been found on only the Banjak Islands. It may be distinguished from *Strix lepogrammica niasensis*, from the neighboring island of Nias by its larger size.

The four recognizable races of this species are:

1. *Strix leptogrammica lepotogrammica* Temminck. Borneo.
2. *Strix leptogrammica myrtha* (Bonaparte.) Sumatra.
3. *Strix leptogrammica niasensis* (Salvadori.) Nias Island.
4. *Strix leptogrammica nyctiphasma* Oberholser. Banjak Islands.

ETHNOLOGY.—*The possible Siouan identity of the words recorded from Francisco of Chicora on the South Carolina coast.* F. G. SPECK (Communicated by J. R. SWANTON).

One of the most baffling problems of American ethnology has been that of the linguistic identity of the tribes inhabiting the coast of South Carolina in the sixteenth century. The meager information left to us by the early Spanish writers who dealt with the region has not been sufficient to dispel the mist of uncertainty as to whether their speech had its affinities with eastern Siouan tribes of whom the Catawba, Tutelo, and Woccon are typical, or whether their relationships were with the Yuchi or Muskhogean groups. Mooney in 1894[1] felt that the affinities of some of these unclassified languages were with Yuchi, while others were probably related to the eastern Siouan group, and the latter conviction has recently taken a more definite phase in the mind of Swanton.[2] Yet their inclination to this opinion rested more upon inferences drawn from the statements of a certain Indian, named Francisco of Chicora, who was taken by the Spaniards in 1521, and who, after his conversion, gave certain information to his captors, than upon any direct correspondence of words with the known eastern Siouan dialects so far as material in them is available. All authorities agree in accepting evidence of a similarity in phonetics and in the *-re* terminations in proper names and place names in the dialect in question as suggestive of Siouan affinity.

[1] JAMES MOONEY, *Siouan tribes of the East*, Washington, 1894.

[2] J. R. SWANTON, *Early history of the Creek Indians and their neighbors*, Bull. 73, Bur. Amer. Ethnology, Washington, 1922.

The descriptions of territory and the customs of the natives given by the Indian Francisco of Chicora applied to countries known as Chicora and Duhare which, after lengthy consideration, Swanton concludes to have been inhabited by some of the small tribes of eastern South Carolina supposed to be Siouan.

Any new deductions from the existing sources tending toward the further elucidation of the problem may be considered acceptable, so I present the accompanying notes which seem to lend a still more definite cast to the Siouan complexion of the tongues under consideration. Swanton, in his thorough survey of the problem, quotes at length from the account of Peter Martyr whose narrative, he says, has hitherto escaped ethnological investigators. By comparing the native terms given therein with Catawba linguistic material secured under the auspices of the Bureau of American Ethnology from the few surviving speakers of this interesting and important language during several recent periods of field work, I am able, I believe, to point out correspondences between the terms in the dialects of "Chicora" and "Duhare" and those in modern Catawba, to a degree which seems to carry the hitherto suspected Siouan determination to a more definite phase.

After looking over the evidence, Swanton adds the following comments in a letter to the writer, explaining more exactly the application of the term Cusabo and defining the supposed boundary between the Siouan and Muskhogean peoples. "I believe the region between the Cape Fear and Savannah rivers to have been occupied by both Siouan and Muskhogean peoples, the former extending southward as far as a point between the Santee River and Charleston Harbor, and the latter including Charleston Harbor and reaching the Savannah and beyond. It is these latter and not the Siouan tribes to which the term Cusabo is properly applied, though it was sometimes extended to include the Sewee and Santee. Francisco of Chicora was, I believe, taken from the Siouan section, somewhere near Georgetown Entrance. The names which he gives are partly those of Siouan tribes and partly, I think, of Cusabo (Muskhogean) tribes, though of course the latter will come to us in a Siouan form and some may even be in a Siouan dialect throughout. The facts do not affect the explanations of words and tribal names offered by you except possibly the last, Inziguanin, which I had thought to be a Cusabo tribe. However, even in that case the word itself may be Siouan."

In the first place it is a most striking fact that all of the syllables in the set of terms applying to Chicora and Duhare, even the two names

themselves, are typical of Catawba. The syllable sequence is also the same; that is to say, all of the terms could mean something in this language, since they represent perfectly possible sound combinations from the point of view of phonetics. The open, long vowels and the consonants occurring in Cusabo all appear in Catawba, and the frequent *r*, like the Spanish correspondent in its trill character, is exclusively eastern Siouan, not Muskhogean nor Yuchi. The endings *-are*, *-ora* and *-re* in three of the terms of Martyr's narrative are also exceedingly typical of Catawba, the *-re* being a predicative element. *Chicora* and *Duhare* are very likely eastern Siouan terms, as may be seen from the varied meanings which may be drawn from them merely in the one language of the group in which we possess enough material upon which to base comparisons.

PLACE AND PROPER NAMES IN CUSABO (from Martyr's relation—1521)	CORRESPONDENCES IN MODERN CATAWBA
Chicora, name of district near Winyaw Bay (Swanton).	*tcikóra* "going slowly," "going down hill" (*tcawakóra* full form), *kóra* "(to) go."

The relative position of the two peoples would have made it possible for the Catawba or other eastern Siouan peoples who resided on the Piedmont plateau to have referred to the coast inhabitants by using a comparative geographical designation. It seems rather more plausible than Gatschet's earlier suggestion; *chicora* = *yutcikere*, "Yutci over there" (Catawba).

Duhare, the name of a kingdom in the neighborhood.	*dugáre*, "(to) return." *hóhare*, "it does not come out." *yúhare*, "to let a thing alone." *dúheare*, "he eats."
Datha, a king's name. (In contemporary Spanish the *th* was pronounced as *t* + *h*, not as in English.)	*táte* (*nA*) "grandfather (my)." *dAt*, "up." *yeʻt À' swà'* "governor, chief."
Xapida, (Xapira) a place name, a town. (The *x* in 17th century Spanish was pronounced like English *sh*.)	*hápi-* (*re*), "here." *yapi·té'*, "flat wood, board." *supì·'*, "trash."
Xathi, a cereal eaten by the Indians	*witì·*, "root, medecine." (*-ti* "root")
Xamunambe, a place name	*yámu*, "in the water,"—*nàmpere* "two." *sámu*, "mouth."
guahi (=*wahi*), an emetic herb	*wa*, a prefix used in plant names. *wá·tap*, pumpkin, *wàkta*, blackberry, *wàpAtù'*, muscadine, *wanAkù'*, hickory). *-hi*, "the," or "like," demonstrative element.

Next we have two proper names commencing with the syllable *in-*. This is most suggestive of eastern Siouan, Catawba *yeⁿ(n)-*, person, human being, male.

Inamahari, name of two wooden idols to which offerings were made.

Inziguanin, Inzignanin, people with long tails like alligators who inhabited a neighboring province. Probably alluding to a myth, cited by Swanton as being common in the Southeast.

yenwahári, people who never die. *wáriwe*, "God, he who never dies." (*waháriwe*).

yeⁿn sigrire, "people stingy," or "people spoiled," also referring to "saltwater" (*iswáⁿ-sigri-*) "river spoiled, salty, the ocean."

Several other terms in the language of Chicora are interesting, for instance the ending *-xungwa, -xuga* occurring in the designations of the god of the north and the god of the south. But no correspondence with them is apparent from a survey of existing Catawba terms.

The similarity between the forms in the documents and those of Catawba is suspicious considering that the accounts were written four hundred years ago by a scribe who did not always spell his words twice in the same way. Besides, the distance between the two languages was something over 150 miles, and the Catawba, an inland Siouan people, have very few terms that would apply to the geography of the coast. I think that Swanton's statement (op. cit., p. 47); "We may feel pretty certain that both (Chicora and Duhare) were in Siouan territory, but more than that we can not say with any degree of assurance," receives a little more assurance from what has just been shown.

SCIENTIFIC NOTES AND NEWS

DAVID WHITE, of the U. S. Geological Survey, has been elected chairman of the Division of Geology and Geography of the National Research Council for the year beginning July 1, 1924.

G. F. LOUGHLIN has been appointed Geologist in Charge, Section of Metalliferous Deposits, of the U. S. Geological Survey to fill the vacancy caused by the resignation of F. L. RANSOME, and F. J. KATZ has been made Geologist in Charge, Division of Mineral Resources, the position vacated by Mr. LOUGHLIN.